Secn. II-37—30,006—26-11-31.

Development (1932—) Department.

MS SERIES.

G.O. No. 1550

DATED 2-12-32

[Despatch Abstract.]

Industries - Government Industrial school, Bellary - Blacksmithy course - Change into Mechanics course - ordered - Revised prospectus approved.

Dev. 2865-II
2-9-32

C.F. 30.

DEPARTMENT.

Received ..... 19 . *Registered* ..... 19 .

Subject.

Government Industrial School, Bellary - conversion of the Blacksmithy course into a Mechanical Engineering course.

ENCLOSURES.
No. 1. Revised Prospectus.
Spare copies.....

No. 349-C/32

Station Madras, *Dated the* 15th September 1932.

From (Name) V.Ramakrishna Esq., M.A., B.Sc., (Edin.) I.C.S.
(Designation) Director of Industries,

To The Secretary to the Government of Madras,
Development Department.

Sir,

In G.O.No.521 Development dated 14th April 1932, the Government were pleased to sanction the creation of the post of an Assistant Lecturer on Rs 60-4-100 for the Government Industrial School, Bellary. With this additional lecturer and the occupation of the Military buildings by the school it is now possible to expand the present blacksmithy course into a mechanic's course on the lines adopted in the industrial schools at Calicut and Madura. The revised prospectus of the school is submitted for approval. The proposal will not involve any additional expenditure. This proposal

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was considered and strongly recommended by the Board of Visitors at the meeting held last month, and I request that the proposal may be approved.

for Director of Industries

B/1919

SN.19.9.

O.M.No. 2865 II/32-1, dated 7.10.32

Letter from the Director of Industries, No. 349-C/32, dated 15th September 1932 - Government Industrial school, Bellary - conversion of the blacksmithy course in to a mechanical engineering one.

The Director of Industries is informed that the Government did not approve the proposals to introduce Mechanical engineering in the Bellary industrial school and agreed to the continuance of the ~~existing staff on~~ staff then in existence with reduced scales of pay. That staff included a lecturer on Rs. 125-5-175 p.m intended for the motor driving course and the pay of the post was reduced to Rs. 60-4-100 p.m. When the motor driving course was abolished in the school the post of lecturer on Rs. 60-4-100 which was sanctioned in lieu of the post on Rs. 125-5-175 should have been surrendered. The Director is requested to state whether this should not have been done and the

~~remaining~~

-4-

remaining staff shown below retained :-

One superintendent on Rs. 180-10-250

2 Instructors on Rs. 40-2½-60 p.m. each

2 clerks on Rs. 35-60 p.m. each

One peon on Rs. 12-15 p.m.

2. The Director is also informed that pending further orders the post on Rs. 60-4-100 p.m. should be kept unfilled.

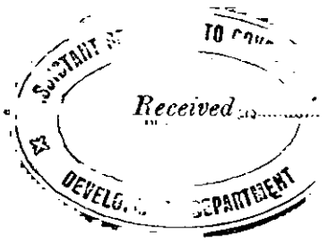
B

To the Director of Industries.

5 Dev. 3460-II

7-11-32 C.F. 30.

INDUSTRIES DEPARTMENT.



Received ..... 19 . *Registered* ..... 19 .

Subject.

Government Industrial School, Bellary - Conversion of Blacksmithy Course into a Mechanics Course.

ENCLOSURES.

No. .....

.....

Spare copies .....

No. 349-C/32.

Station Madras, *Dated the* 3rd November, 19 32.

From (Name) V. Ramakrishna Esq., M.A., B.Sc.(Edin)., I.C.S.,

(Designation) Director of Industries.

To The Secretary to the Government of Madras,

Development Department.

Sir,

Pp 3-4 supra.

Reference:- Government Memorandum No. 2865-II/32-1 dated 7th October 1932.

(F)

I invite a reference to G.O.No.MS.385 Development dated 16th March 1932, ordering the closure of the motor sections attached to the Schools at Calicut, Bellary and Mangalore, and also to my letter No.846-C/31, dated 18th May 1932, reporting to Government the staff disbanded in consequence of the closure. The post of Assistant Lecturer on Rs.60-4-100 sanctioned in G.O.No.521 Development dated 14th April 1932 is not in lieu of the post of

Pp 142 of Go. 980 (M) 21.7.32.

(K)

P.T.O.

of Motor Lecturer on Rs.125-5-175 which was abolished, as the Government seem to think, nor was its sanction conditional on the introduction of any new courses of study but it was only intended to meet the natural development of the School. The proposal to change the "blacksmithy" into "Mechanic's" course is merely a change of designation and does not connote any fundamental alteration in the syllabus of instruction. I request that the syllabus may be approved and that I may be permitted to fill up the Assistant Lecturer's post immediately as it will be extremely difficult for the Superintendent to carry on the work of the School efficiently without an assistant.

1 A.

for Director of Industries.

CDB.5-11

Dev Depn.

O.M. No. 2865-ii/32-1g

Letter from the D.I., No. 349-32, Dated 15.9.1932 - Govt. Industrial School, Bellary — conversion of the blacksmithy course into a mechanical Engg. —

—

The Director of Industries is requested to report definitely whether he can run the existing courses in the Govt. Industrial School, Bellary, without the asst. Lecturer on Rs 60-4-100 sanctioned in G.O.No. 521 Dev., dated 14th April 1932.

(c)

26.9.32

I don't see the need for this. Cripps g.o. (c) (d) Shd. we not put up on the file. was this mr Stracey's post. new apptt sanctioned in that g.o. or was it in addition to the apptts sanctioned?

26.9.

To the D.I.

Dev.Dept.

To A.S.

With reference to 'A' above the original of G.O. No.521, Development dated 14-4-32 and the destroyable originals are submitted below. (K) (T)

2. Please see the Director's letter in the c.f. The question of the conversion of the blacksmithy course in the Govt.Industrial School, Bellary, into a mechanical engineering one was already considered and negatived on the ground of expenditure - vide para 5 of G.O. No.521 Development dated 14-4-32. (K) The Director now raises the question and asks for sanction to the proposal on the ground that he can manage with the sanctioned staff - the additional lecturer sanctioned in G.O.No.521 Dev., dated 14-4-32. (K) c.f

3. The Lecturer in question was sanctioned in the following circumstances. While submitting proposals for the revision of the staff of the Govt. Trades School, Mangalore, and the Industrial Schools at Bellary and Calicut the Director suggested a reduction of the staff in Mangalore and Calicut and asked for additional staff for Bellary on the ground that he wanted to convert the blacksmithy course into a mechanical engineering one. The proposal was not accepted and it was ordered that the existing staff might continue in Bellary. The staff which existed before the reorganisation and after are shown below:-

Letter at pp 1-3 of c.f. 521/14-4-32 (K)

Vide Govt's orders at A 2 in the Margin of page 3 of (T)

	Before re-organisation.		After re-organisation.
Superintendent on Rs.	200-20-500	1 -	180-10-250
Lecturer "	125- 5-175	1 -	60- 4-100
Two Instructors "	40-2½- 60	2 -	40-2½- 60
Two Clerks "	35-60	2 -	35-60
Two Peons "	12-18	1 -	12-18

Vide page 13 of

In the meantime when issuing orders ~~previous to this orders had been issued in~~ vide

paras. 1 and 3 of G.O.No.385, Development dated (F)

dated 16-3-32, abolishing the motor courses in the Bellary, Calicut and Mangalore Schools, the Govt. had under ~~and asking~~ the Director of Industries to disband the staff sanctioned in each of these schools for the motor driving section. As a result of this order the Director abolished the post of Motor Lecturer on Rs.125-5-175 in the Bellary School - vide Director's letter at pp.1-2 of G.O. No.980, Development, dated 21-7-32. The orders in G.O.No.521 Dev., dated 14-4-32, were issued before the receipt of Director's letter and the Director should have brought to the notice of Government that the Lecturer on Rs.60-4-100 sanctioned in the G.O. was not necessary. In another connection the Director has reported that the post has not been filled up. In the circumstances, it is submitted that the post may formally be abolished. A draft O.M. is submitted for approval. After issue, the entry 'One Assistant Lecturer on Rs.60-4-100' under Bellary in para. 9 of G.O.No.521 Dev. dated 14-4-32, will be deleted from all copies of the G.O.

(M)

(K)

(X) Sent to Pub. Serv. W.O

A on P.6. Go 521/14.4.32 (K)

Let us explain the position to the D.I. and ask whether he should not have dispensed the post with 60-4-100 which was given to him in substitution of the one with 125-5-175.

5.10.32. KR

Jak Govt

Mat P 13 at (T)

The position is that the Govt. disagreed as to the need for continuing the Secretly courses and agreed to allow the existing staff to continue in the School. That staff included a lecturer with 125-5-175 and the courses included motor driving. When motor driving courses

Para 5 of Go 521/14.4.32 (K)

A at P 31 at (T)

Lm P 13 at (T)

was also there, the teacher's post was
PP 14 21 Gp 980 Dev (M) 21/7/32. submitted under the D.I. She have retained
only the rest of the old staff, viz:-
A at p 6 n/c 521 (K) 14-4-32 1 Supt
2 Instructors
2 clerks and
1 peon

The D.I. also held that pending further
orders this post will be kept in abeyance.
Draft on file. RL
7/10/32

To A.S.

A draft O.M is submitted
below for approval.

KR
7.10.32
JAR
7/10/32

Issue
RR
7/10/32

PP 3+4 cf [Issued as O.M. No. 2865-II/32-1 Dt. 7-10-32.]
PP 5 reference [Receipt of Letter from the D.I. No. 349-C/32 Dt. 3-11-32]

To AS

Please see the O.M. to the D.I.
on pp. 3 and 4 cf and his reply on pp 5 + 6 cf.
A at p 6 of 3a 521 (K) 14-4-32 the Assistant Lecturer's post sanctioned
in cf. O. No. 521 Dev. Dt. 14-4-1932 was not
intended to meet the natural develop
6. cf ment of the school as the D.I. seems

7/

The position is as that explained in A.S.O. Note on pp 3-4 ante

to think. As the Govt. have already observed that the introduction of Mechanical Engineering course in the School cannot be taken up until the financial outlook improves, it is submitted that this question cannot be taken up again now. Submitted that the Assistant Lecturer's post sanctioned in G.O. No. 521 Dev Dt. 14-4-32 may be abolished as it is not necessary for the conduct of the courses now existing in the School. The draft order below is for approval. ~~It may be sent to Fin. for perusal and return~~

Para 5 on p 6 of G.O No 521 Dev 14-4-32 (K)

A at p 64, 9 c ibid (K)

KR
11.11.32

RL
28.XI.32.

RR
29.11.32

There is perhaps some confusion, but I think the D.P.I. should be excused for thinking that G.O. 521 of 14/4/32 entitled him to have an Asst Lecturer on Rs 60—100 at Bellary. That appointment was sanctioned & in spite of the disapproval of the mechanical engineering course proposal; and it does not appear that either the old post on Rs 125—175 or the new one on 60—100 (at any rate at Bellary) was necessarily dependent on

(necessarily)

the mechanical engineering course.

The Dept's present request [illegible] seems to be considered [illegible] approved

Sec
30/11

Papers
SB
30/11

aired. on 30/11/32
Retd. 30-11-32

Pl arrive
KR
30-11-32

: M 3 : SB 30/11

Sec 30/11. To AS.

A revised draft
Submitted below for approval.

KR
30-11-32

KR
1-12-32

1-XII-32

Sectt. II-5 (a)

Development DEPARTMENT.

	(Date.)	Initials.
When received for Fair-copying.	1-12-32	
When copied ..		
When examined ..		
When signed ..		
When despatched ..		

Industries - Govt. Industrial School, Bellary - Blacksmithy Course - change into Mechanic's Course — ordered - Revised prospectus approved.

READ AGAIN G.O. No. 385 Dev, dated 16-3-1932 (F)

" " " " 521 Dev " 14-4-1932 (K)

READ ALSO :—

C. No 2865-II/32 From the D.I., No. 349-E/32 dated 15-9-1932

" " " O.M. W the D.I. " 2865-II/32-1 " 7-10-1932

" " 3460-II/32 " " D.I. " 349-E/32 " 3-11-1932.

ORDER.

No. 1550, dated 2-12-1932

MS.

The Govt. have no objection to the Blacksmithy Course in the Govt. Industrial School, Bellary being renamed 'Mechanics course' and to the issue of the prospectus as now revised. The post of the Assistant Lecturer on Rs 60-4-100 sanctioned in G.O. No. 521 Dev. Dt. 14.4.32 may now be filled up.

Amp 6. ef.

* Kept at the bottom of the file.

(K) and

B. amp 4 ef

To the D.I. (best)

KR 1.12.32

KR 1.12.32

1.12.32.

PROSPECTUS

OF THE

GOVERNMENT INDUSTRIAL INSTITUTE, MADURA

School, Bellary.

MADRAS
PRINTED BY THE SUPERINTENDENT, GOVERNMENT PRESS

1931

Gratis

PROSPECTUS OF THE GOVERNMENT INDUSTRIAL INSTITUTE, MADURA.

School Bellary.

VISITORS.

The Institute is under the control of the Director of Industries assisted by the following Board of Visitors :—

OFFICIAL.

The Director of Industries (Ex-officio Chairman).
The Inspector of Industrial Schools (Ex-officio Secretary).
The Collector of Madura.
The District Medical Officer, Madura.
The Executive Engineer, Madura Drainage Division.

NON-OFFICIAL.

The Chairman, Municipal Council, Madura.
The Chief Engineer, Madura Mills.
The Manager, Pasumalai Trades School.
The Presidents, District Boards, Madura, Ramnad and Tinnevelly.
The President, Taluk Board, Madura.
The Managing Director, The Meenakshi Mills, Madura.

The School was opened by the Dept of Industries in July 1929.

STAFF.

Superintendent.
Assistant Superintendent. Lecturer
Machine-shop Foreman.
Motor-car work Lecturer.
Instructor in Engineering.
Drawing Instructor.
Carpentry Instructor.
Assistant Carpentry Instructor.
Blacksmith Instructor.
Foundry Instructor.
Fitting and Turning Instructor.
Warden.

COURSES OF STUDY.

The Institute provides long-term courses apprenticeship in—

(1) Carpentry and cabinet making.
(2) General mechanic's work.
(3) Short special courses in oil-engine driving, and in motor-car driving and maintenance.

Instructions will be almost entirely practical (drawing and practical arithmetic included) and will aim at fitting the students for work as artizans in wood and metal.

The students will learn by doing practical work under skilled supervision and must be prepared to undertake whatever work may be given them to do. No attempt will be made at this institute to provide advanced theoretical engineering courses, but every effort will be made to turn out skilled practical workmen capable of maintaining running machinery in good repair and in a state of economic efficiency.

An apprentice will be allowed to take one course only—wood work or ~~metal work~~. The wood working course will comprise instruction and practice in the construction of good sound furniture, preparation and erection of wood work in buildings, rattaning, carving, painting and upholstery.

The ~~metal work~~ course will include instruction and practice in blacksmithing, moulding, pattern making, fitting and turning, ~~motor car repair work~~ and also management of running machinery. The syllabus of work, time-tables, etc., are given below.

EQUIPMENT.

The institute is provided with well-furnished workshops equipped with power-driven machinery.

~~Special facilities are available for motor car repair work. An electric plant with storage batteries is available and two cars are maintained for giving practical lessons in driving.~~

Separate class rooms are provided for theoretical instruction. A library is also provided for the use of students.

~~A hostel is provided, one of the staff acting as resident warden in charge.~~

~~The hostel adjoins a large playground, has accommodation for about 80 boarders, and is provided with three separate kitchens.~~

Ample provision exists for apprentices to indulge in recreation such as football, cricket, badminton and gymnastics.

GENERAL INFORMATION.

There are two apprenticeship courses—

Wood work
~~Metal work~~ } For details of the courses, see syllabus.

Apprentices will be permitted to take only one course.

Apprentices will be on probation for six months, and if, on an examination held at the end of this period, found satisfactory will be permitted to enter on the full period of training which will extend to five years including the period of probation.

If found unsatisfactory, their probation will be terminated.

ADMISSIONS.

Application for admission must be made on the prescribed form which can be obtained on application to the Superintendent. The form should reach the Superintendent on or before 30th June and

the applicants should appear in person to ascertain if their applications are favourably considered.

(*a*) Admissions will ordinarily be made on the first working day in July each year.

(*b*) Admissions will be limited ~~to 24~~ in any one year, ~~not more than 16 being admitted to the metal working section.~~ 16 in cabinet making 12 in mechanics.

(*c*) ~~The sanctioned strength is 100 apprentices and the~~ Superintendent may make extra admission to keep the numbers at that figure.

(*d*) Only ~~a few paying~~ apprentices may be entertained over and above this ~~number. They will have to abide by the~~ rules prescribed.

QUALIFICATIONS FOR ADMISSION.

AGE.

Over fifteen years and under eighteen years.

EDUCATION.

A candidate should have passed at least the first form. Preference will be given to students who have studied beyond the stage laid down as the minimum qualification A school-leaving or transfer certificate from the school last attended must be attached to the form of application for admission.

PHYSICAL FITNESS.

Applicants should be strong and healthy and fit for manual labour, free from disease or deformity, vaccinated, and willing to undergo medical examination.

Candidates must further produce a certificate of good conduct from some well-known person who has known the applicant for at least three years, and must be prepared to give a written undertaking that they consent to abide by the rules of the institute. A similar undertaking on the applicant's behalf must be given by the applicant's parent or guardian.

SCHOLARSHIPS ~~AND STIPENDS.~~

No fees are charged for the 5 years courses. Scholarships will be granted, limited to cases where it is absolutely necessary, subject to a maximum of 33 per cent. of the students on the rolls, and at the following rates :—

First year	...	...	Rs.	5 per mensem.
Second „	...	...	„	5 „
Third „	...	...	„	6 „
Fourth „	...	...	„	8 „
Fifth „	...	...	„	10 „

An examination will be held at the end of each year. Students failing to pass the prescribed test will not be promoted but may be given a second chance. In case they prove unsuccessful at the second attempt their apprenticeship will be terminated. The Superintendent may however terminate the apprenticeship of a student whom he considers to be not deserving a second chance or for other reasons properly recorded. An appeal will lie with the Director whose decision shall be final.

the prescribed test will not be promoted but may be given a second chance. In case they prove unsuccessful at the second attempt their apprenticeship will be terminated. The Superintendent may however terminate the apprenticeship of a student whom he considers to be not deserving a second chance, or for other reasons properly recorded. An appeal will lie with the Director whose decision shall be final.

WITHDRAWALS, ABSENCES AND LEAVE.

No apprentice may be withdrawn from the institute nor may he absent himself from duty without the previous permission in writing of the Superintendent, except in the case of sudden or serious illness of the apprentice himself certified by a properly qualified medical officer. ~~All applications for leave should be endorsed by the Warden in the case of hostel boarders and by the~~ parents or guardians, ~~in the case of apprentices permitted to reside~~ outside the hostel. Apprentices failing to put in a minimum attendance of ~~250~~ 225 days in a calendar year may be detained in the same class for the next year. Absence without leave for a longer period than one month will entail dismissal.

Ordinarily, no leave will be granted except for sanctioned holidays and for fifteen days in May or June. There is no vacation and the fifteen days' leave in May and June will be granted to apprentices in reliefs.

HOURS OF ATTENDANCE.

Mondays to Fridays, 7-30 to 11-30 a.m. and 1 to 5 p.m.
Saturdays, 7-30 a.m. to 12-30 p.m.

CERTIFICATES.

Certificates setting forth the syllabus of work undertaken and the progress made by the apprentice will be granted to apprentices who complete the course. No certificate of any kind will be granted to apprentices who do not complete the whole course or to apprentices who are dismissed or expelled for any cause whatever.

~~BONUSES.~~

~~A bonus will be granted to every apprentice who satisfactorily completes the whole course. The bonus will be paid only on completion of the course and will be calculated at the rate of one month's average wages for each completed year of apprenticeship. The bonus of an apprentice who completes the course but whose work has not been entirely satisfactory may be reduced or withheld although the course had been completed.~~

FEES.

No fees will be charged for tuition, but a deposit of Rs. 25 must be made by each apprentice before he is allowed to start work.

The deposit will be forfeited if the course is not completed or if the apprentice is dismissed or expelled for misconduct or may be

drawn on to make good any damage to the property of the school caused through the student's fault or neglect. Any sums to be so paid from the deposit before the completion of the course must be made good by the apprentice in such instalments as the Superintendent may direct. The deposit or the balance to the credit of the apprentice will be refunded on the completion of the course.

In cases of failure to complete the course owing to causes outside the control of the apprentice or his guardian, the Director may order the refund of the deposit or such portion of it as he considers reasonable in consideration of all the circumstances of each individual case.

PAYING APPRENTICES.

In addition to the sanctioned number of paid apprentices, a limited number of paying apprentices nominated and supported by local boards, etc., or those who are prepared to pay for their own training will be admitted. For the present, the number of such paying apprentices will be limited to three per annum in the wood work section and six per annum in the metal work section.

These paying apprentices may be nominated by private persons or by local bodies. They will be charged tuition fees at the rate of Rs. 12 per annum payable in advance at the beginning of each year and must deposit the same amount as the other apprentices. They will be treated in every way the same as paid apprentices but will not be paid wages. They will be eligible for bonus calculated on their attendance, and at the rate they would have earned as paid apprentices. Private persons or public bodies nominating such apprentices must be prepared to bear the whole cost of their support whilst in training, including clothing, hostel charges and charges for books and necessary articles for the apprentices' use in the school and in the workshop.

HOSTEL.

Unless special permission is granted by the Superintendent for an apprentice to live outside, all apprentices must live in the hostel. Permission to live outside will only be given in very exceptional circumstances and not unless the parties proposing to lodge the apprentices can satisfy the Superintendent that their arrangements are in every way satisfactory and that the quarters proposed to be occupied by the apprentices are within a reasonable distance from the institute. Such permission may be withdrawn at any time by the Superintendent, and the apprentice instructed to remove to the hostel without any reason for the removal being given. When apprentices are permitted to reside outside the hostel, they will not be entitled to the scale of wages laid down, but will draw two annas less per diem.

HOSTEL FEES.

All inmates of the hostel will pay hostel fees. No charge will be made for room rent or supervision. The hostel fees will be entirely utilized to cover the cost of foodstuffs, wood and cooking.

The fees will vary according to the price of foodstuffs and cost of cooking, but an effort will be made to keep the rates as low as possible. In no case will more than Rs. 15 per month be charged. In practice, it is hoped to keep the cost of feeding much below this amount. (The average cost during the last two years had been under Rs. 12.) All apprentices joining the hostel shall pay an advance of Rs. 12. At the end of the month any amount standing to the credit or debit of the apprentice after deducting the cost of the month's board, will be carried to the next month's payment and the apprentice called upon to pay the balance to restore the advance to Rs. 12 before the fifth of the next month.

The warden will prepare a statement of receipts and expenditure for each month, and a monthly abstract of the hostel accounts will be furnished to the parents and guardians concerned, if they apply to the warden in writing before the end of the next month.

In the case of paid apprentices these monthly payments will be made by recoveries from the wages due to the apprentice at the end of each month, the balance due to or by the apprentice being paid to or by him in cash before the fifth of the next month.

SHORT COURSES.

Special short courses in oil-engine driving ~~and in motor-car driving and maintenance~~ will be conducted for a limited number of students.

Fees will be charged for these short courses at the rate of Rs. 12 per month paid three months in advance. Admission will be limited to those who can satisfy the Superintendent that they can make good use of the instruction provided. The length of the course will vary with the requirements and ability of the student, but will ordinarily be for six or twelve months' full time. Students taking short special courses will not be paid wages but will be required to attend regularly and keep regular hours and carry out any instructions given them.

Students desiring such short courses, or their employers or prospective employers should address the Superintendent stating definitely their requirements and difficulties and soliciting his advice and his assistance. Every such application will be treated as a separate special case and assistance rendered up to the limit of the accommodation available. Certificates will be granted to those who satisfactorily complete these short courses.

SYLLABUS.

Long Term Courses.

~~METAL WORK~~ Mechanical SECTION.

(THEORY.)

FIRST YEAR.

Two periods of one hour each per week.

Iron and Steel.—(*a*) Different kinds of iron—composition and commercial uses; influences of different constituents; alloys, their composition and their uses; Elements of smithy and forging; Open and hollow fire; Smiths' tools; hardening, tempering; case hardening; annealing and welding; soft and hard soldering, etc.; brazing; fluxes used in welding, soft and hard soldering, brazing markers. (*b*) Templates. Their use in smithy practice.

Patterns and Pattern Making.—Materials used; allowances for contraction; tools used; names of various joints; pulley pattern; method of making arm joints.

Foundry Work.—Principles of moulding; moulding sands; green and dry sand moulding; loam work; cores and core boxes; moulder's tools; cupola practice; defects in casting—their causes and remedy; types of blowers; fuel and metal; chilled casting; malleable casting; brass founding and furnace.

Principles of fitting.—Fitter's tools, preparing chisels; grinding, hardening and tempering chisels; files; callipers; squares; scribing block; bevel slot gauges; marking off work.

SECOND YEAR and Third

Two periods of one hour each per week.

Lathes and their construction.—General outline of mechanism, lathe tools, marking off work; screw cutting and calculation of change of gears, right and left hand threads.

Drills and Drilling Machine.—Flat and twist drills; taper and parallel shanks; elements of grinding; marking off taps—dies and ratchet braces.

Shaping and Planing Machine.—General principles of working.

~~*Milling Machines.*—Milling cutters; simple milling work; dividing attachment for gear cutting; cutting spur wheels.~~

Machine tools—General.—Cutting feeds and speeds; cutting angles of tools; correct method of grinding tools; lubrication; common workshop tools and measuring instruments and their uses.

Fastenings.—(*a*) Bolts and nuts—forms and proportions of threads; pipe threads; proportions of bolts and nuts; forms of heads; special threads.

(*b*) Rivets and rivetted joints—forms of rivets; pitch margin and overlap; single and double rivetting; strength; position of rivets in tie bars and struts; applications to various structures.

~~Fourth~~ ~~Third~~ Year.

Two periods of one hour each per week.

Lever principles and its application to simple machines a pulleys, wheel and axles, etc.; centre of gravity; principles c work; useful and lost work; efficiency of machines.

Friction.—Loss of power due to friction in machinery; methods to reduce friction; lubrication by different means; bearings for rotating pieces; self-lubrication, roller and ball bearing.

Transmission of power by (*a*) belts, (*b*) ropes, (*c*) chains, (*d*) gears, (*e*) worms; relative advantages of different drives; belt fasteners and splicing; calculation of speed ratio in transmission; shape of pulley faces; fast and loose pulleys; pulley blocks, simple, compound and differential; stepped speed cones.

~~Fourth~~ Year.

Two periods of one hour each per week.

Applied Mechanics.—(*a*) Forces in equilibrium; parallelogram and triangle of forces; stresses in jib cranes, and simple roofs.

(*b*) The following terms as used in applied mechanics:—Stress; strain and elasticity; Young's modulus of elasticity; tensile, compression and shearing stresses; yield point; breaking stress and point; factor of safety; working stresses for iron and steel and other materials used in Mechanical Engineering.

Hydraulic Machines.—(*a*) Principles of hydraulics and pressure due to head; application to pipes in distribution; water meter with special reference to venturi-meter. Forms of pump of water wheels; other hydraulic machinery.

Heat.—Properties of heat; units of heat; expansion and compression of gases; fuel economy in combustion; study of common fuels; woods, charcoal, coke, crude oil, petrol, kerosene, coal and water gas.

Boilers.—Generation of heat; boiler types and fittings—their care; scales and their removal; economizers.

Fifth Year.

Two periods of one hour each per week.

Generation of steam; latent heat; wet, dry, superheated steam; properties of steam; work of expansion; steam tables and their uses.

Steam engines—slide valve diagrams; effect of fly wheel, use of lubricators; indicated horse power; governors and condensers; calculation of net or brake horse power. Internal combustion engines, four stroke, two stroke and diesel. Gas and suction producers. Rice and other common mufassal machinery. Elementary electrical engineering, calculation of size of wires in distribution, care of accumulators, calculation of power required to drive generators by (*a*) steam engines, (*b*) internal combustion engines.

(a) Elementary principles of working of four stroke & two stroke oil and gas engines.
(b) construction & performance of different kinds of pumps
(c) Elementary theory of steam engines and boilers.

MACHINE DRAWING.

FIRST YEAR.

One period of two hours per week.

1. *Freehand and Outline.*—Ornamental outlines such as are used on wood work; copying to different sizes; practice in neat lining.

2. *Model Drawing.*—Drawing simple solids and combination of solids placed at various distances and heights.

3. Lettering and dimensioning—printing the heading.

4. General instruction regarding the use of drawing boards; T squares; scales and ordinary instruments; use of set squares in drawing parallel lines, bisecting lines and angles; construction of the various possible angles with the aid of set squares only.

5. *Plane Geometry.*—Elementary problems dealing with lines and angles. Bisecting a straight line; dividing a line into any number of equal parts; bisecting angles; constructing various possible angles with the compasses only; construction and use of scales. Drawing of squares, rectangles, triangles, quadrilaterals from a given data; constructions of regular polygons; regular polygons described and inscribed in a circle with compasses and set squares; describing circles to satisfy given conditions; tangents; similar figures. Dividing into equal areas; plane curves; parabola; ellipse.

6. *Solid Geometry.*—(*a*) Isometric projection—Simple rectangular objects, prisms, pyramids, cones.

(*b*) Orthographic projection—co-ordinate planes and principles of projection; connexion between plane, front elevation and side elevation; projection of points, lines and planes and solids in simple and inclined positions; sectional view of simple solids; development of simple plane and curved surfaces.

(*c*) Perspective projections; elementary notions.

SECOND YEAR.

One period of two hours per week.

1. More difficult problems on the portions covered in the first year.

2. Perspective projection of simple models and combination of models from given data.

(*a*) Sectional lining and colouring for various materials used in engineering; various forms of screwthreads—single, double, right hand and left hand; fastening such as bolts, keys, cotters, rivets, and riveted joints with special reference to girders and tank work; vices and machine handles.

(*b*) Copying to any scale from actual drawing the following machine parts and adding additional views if required:—

1. Shafting collars and shafts; couplings and clutches.

2. Plummer blocks—self-adjusting pedestals; swivel and hanger bearings; foot step or pivot bearings.

3. Wall brackets; wall boxes.

4. Pulleys to transmit power through hemp rope, wire rope, chains and belt.

Cone pulleys, fast and loose pulleys and belt striking gears.

5. Simple parts of steam engines—piston and piston rods; cross heads and guides; connecting rods.

6. Chains and crane.

7. Pipes and pipe connections.

THIRD YEAR.

One period of two hours per week.

1. Making rough dimensioned sketches of the second year portion and the following from actual working models:—Drawing the same to any required size and adding any additional views that are required. Method of rapid sketching.

(*a*) *Machine tools.*—Parts of lathe, the fast and loose head stocks, the slide rest, chuck, the steady rest, the travelling steady, face plate, angle plate, drilling machine parts, machine vices, other clamping device, cutting tools with special reference to cutting angles.

(*b*) *Pumps.*—Details and parts.

2. Detailing from assembly drawing and assembling from details.

3. Making working drawings from given data and specifications.

FOURTH YEAR.

One period of two hours per week.

1. Practice in making working drawings from given data and specifications.

2. Drawing of spur, bevel, worm and spiral gears and cams from given data.

3. Calculation of strength in simple cases and designing simple machine parts as bolts, keys, cotters, pins, piston rods and rivetted joints, belts.

4. Practice in reproducing drawings with special reference to tracing and ferro-printing.

5. Lay out of a typical mechanical engineering workshop showing in detail the position of engines, the machine shop with the shafting and tools, battery room and the office, etc.

WORKSHOP MATHEMATICS.

FIRST YEAR.

One period of one hour per week.

Whole numbers.—Place value of digits in a whole number; idea of free and renumbers; addition, subtraction, multiplication and division of free and renumbers. Use of brackets, their insertion and removal; simplification involving the four operations and removal of brackets; simple problems.

2. *Vulgar fractions.*—Simple idea of fraction; reducing the fraction to the lowest terms; proper and improper fractions; arranging fraction in the order of magnitude; addition, subtraction, multiplication and division of fraction; simplification, solving of simple problems involving fractions.

3. *Decimals.*—Place value of digits in a decimal number; conversion of decimals into fractions or fractions into decimals; addition, subtraction, multiplication and division of decimals; degrees of accuracy; approximation; contracted multiplication and division; labour-saving methods; limits of error; simple problems.

4. Proportion, ratio, and percentage.

5. Square root.

6. *Measurement.*—The various tables and the common instruments.

SECOND YEAR.

One period of one hour per week.

1. *Mensuration of plane figures.*—Units of lengths and areas; areas and perimeters of plane rectilinear figures as squares, rectangles, triangles and quadrilaterals. Circumference and areas of circles; areas and perimeters of similar figures; areas of sectors and segments of circles; areas of irregular plane figures by mid-ordinate andother rules.

2. *Mensuration of simple solids.*—Units of volumes and surfaces; volumes of cubes and rectangular solids; surfaces and volumes of prisms, cylinders; pyramids, cones and spheres, frustum of pyramids and cones, segments of spheres; mensuration of heights and distance by drawing.

3. Weights and densities of the common materials used in engineering.

4. Application of the foregoing to problems on length, area and volume, weight having reference to daily problems in the work of apprentices.

5. *Algebra.*—Sufficient for the intelligent use of formulæ; the four operations; use of brackets; simple and simultaneous equations.

6. Problems such as contractor has to solve in putting in a bid for works. Problems to vary with the course the student is pursuing.

THIRD YEAR.

One period of one hour per week.

1. Graph and curve plotting with special reference to the dates or variables met with in engineering.

2. ~~Labour-saving methods—logarithms.~~

3. Indices just sufficient for numerical application to engineering formulæ.

4. Elementary trigonometry to enable numerical calculation of formula with the help of trigonometric tables.

5. Elementary dynamics ~~just enough to make the student understand the various units~~ used in engineering.

WORKSHOP PRACTICE.

FIRST, SECOND AND THIRD YEARS.

Full time.

Smithy.—1. Practice in the use of smithy tools.

2. Use of templates in smithy for repetition work.

3. Practice in welding; annealing; hardening and tempering; case hardening; soldering, soft and hard; brazing.

4. Boiler and angle iron: smith's work—bending plates and angle iron; rivetting; caulking; punching; drifting.

5. Practice in taking correct quantity for any forging as per sketch or model, and forging to the correct dimensions.

6. Gauging temperature of furnaces by colours and with the help of different kinds of pyrometers.

Foundry work.—(*a*) Pattern making in wood and loams.

(*b*) Moulding—Practice in preparing sands and loams for mouldings; moulding loam—dry and green sand; use of the various moulders' tools for moulding.

(*c*) Cupola practice—Building furnaces, lining and charging cupolas.

(*d*) Practice in brass founding—Casting practice; cleaning castings.

Fitting.—(*a*) Chipping, filing, scrapping and erecting; marking off work for machining; fitting pins, cotters, key ways, studs, etc.; Lining, scrapping and adjusting bearings; tapping, hand-reaming; drilling holes with drills and ratchet brace; erection of shafting; setting for steam and oil engines.

(*b*) Repairing measuring instruments; making squares and other simple tools.

(*c*) Mill weight work. General repair of machine tools and parts and driving machinery.

(*d*) Ability to overhaul and fit up simple machinery as steam-engine, oil-engine and pumps, etc.

Machine shop.—(*a*) Operating lathes.

(*b*) Drilling, planing, boring, slotting and shaping work.

(*c*) Milling work.

NOTE.—During the period, an apprentice will be moved about from one section to another at the discretion of the Superintendent after undergoing a period of 3 to 6 months' training in the carpentry section.

FOURTH AND FIFTH YEARS.

Full time.

Specialization in a particular section such as foundry, smithy, fitting, machine shop.

NOTE. The wishes of the student and his guardian will be considered, but the Superintendent has the deciding voice as to which section a student shall specialize in.

MOTOR GARAGE MECHANIC'S WORK.

Two years' specialization for apprentices who have completed three years in the metal working section and wish to become garage mechanics.

THEORY.

Two periods of two hours each per week.

Preliminary description of the general principles and construction of motor-cars.

Detailed instruction on each part as follows :—

Power unit engine (the petrol engine).—Its various parts. Cylinders, pistons, valves, timing wheels, camshafts, crankshaft, etc., their operations. The calculation of power (h.p.) by bore and stroke. The cooling and lubricating systems. The function of the fly-wheel.

Carburation.—The component parts of carburettors and their actions. Correct proportions of petrol and air. Examples of well-known carburettors and the advantages claimed for each.

Ignition accumulator, coils and magnetos.—The component parts of coils, accumulators and magnetos. The uses and operations of same. H.T. magnetos, wiring for different types. How H.T. current is induced for H T. ignition.

Reasons for advancing and retarding ignition.

Fixed and variable ignition. Ford ignition

Clutches.—Various types, leather lined, single and multiple plate clutches (the Ford and Hele Shaw pattern, etc.), types most commonly used.

Steering.—Various designs of steering devices. The Ackerman type, rack and pinion, ball and socket, etc.

Transmission (gear box) propeller shafts and torque rods, etc. (back axle).—The construction of the gear box and its component parts : their uses. The gate and quadrant change.

The description and function of the universal joints, cardan blocks, enclosed propeller shafts, tarque and radius rods.

Various types of drives. Live axle, bevel and worm, and chain drive. Advantages claimed by manufacturers for each. The construction and use of various types of differential gearing.

Foot and side brakes.—General design of brakes and how the brake power is distributed and balanced.

WORKSHOP PRACTICE.

Engine.—Removing valves, timing wheels, timing case, etc. Timing the engine and bolting and reassembling all parts.

Carburettor.—Dismantling and reassembling a carburettor. Correct throttle adjustment.

Magneto.—Setting the platinum points. Dismantling, timing and reassembling a magneto. Connecting magneto to engine.

Engine and magneto timing.—Finding the sequence of firing and the correct position of the make and brake in relation to the distributor. Wiring up engine, magneto and switch, with high-tension leads and switch wire.

Engine starting.—Starting engine up with safety. The correct position of gear and brake levers. The correct way to grip a starting handle. How to switch on flood carburettor, set throttle and ignition levers.

Clutch.—Operating the clutch.

Gear box.—Changing speed.

Back axle and brake.—Use of the hand and foot brakers. Oiling and greasing all working parts.

Tyres and wheels.—Instruction on the composition of tyres. The formation of cover and tube. The importance of maintaining the correct pressure of air suitable to the condition and size of various tyres.

The correct handling of tyre levers and precautions to be observed in their use.

Practice in removing and fitting tyres and temporary repairs to cover and tube. The construction and care of inner tube valves. Various types. Practice in fitting spare wheels. Various types.

General overhaul.—Removing radiator, carburettor, magneto, exhaust pipe and silencer, cylinders, and piston, crank case, clutch and clutch shaft.

Dismantling the crank case and taking off big end bearings from crank shaft. Taking down and dismantling the gear box, back axle and springs.

Examining all parts as they are taken to pieces, reassembling and replacing in the chassis and adjusting the whole of the above, re-timing the engine fitting water joints to radiator and making all necessary adjustments on the car ready for starting up the engine.

WOOD WORKING SECTION.

DRAWING AND THEORY.

FIRST, SECOND AND THIRD YEARS.

Two periods of two hours each per week.

1. General instructions regarding the use of drawing board, T square, set squares and drawing instruments.

2. The following simple problems of practical plane geometry essential for wood-workers:—

(*a*) Bisecting lines and angles.
(*b*) Dividing a line into any number of equal parts.
(*c*) Construction of any regular polygons in a given circle, and on a given line (general method).
(*d*) Construction and use of simple scales.

3. Lettering and printing the headings.

4. Principles of projections and connexion between plane, elevations and sections.

5. Simple solid geometry, cube, prisms, pyramids and cylinder to enable the student to project different views.

6. Preparation of dimensioned sketches and making working drawings from same.

FOURTH AND FIFTH YEARS.

Two periods of two hours each per week.

More advanced working drawings of furniture, house joinery and carpentry. Estimating and costing work on hand.

WORKSHOP MATHEMATICS.

FIRST AND SECOND YEARS.

(As for metal working students.)

MATERIALS.

THIRD YEAR ONLY.

One period of two hours per week.

Various timbers, their characteristics and uses, seasoning, purchasing, conversion, storing and economic cutting.

Locks, hinges and other fittings used in cabinet making, joinery and carpentry.

WORKSHOP PRACTICE.

FIRST AND SECOND YEARS.

Marking and laying out timber, exercises in making simple joints, erection of simple wood work in buildings such as joists, bressummers, simple doors, etc., and the manufacture of simple furniture and rattan work.

WORKSHOP PRACTICE.

THIRD, FOURTH AND FIFTH YEARS.

Making doors and ventilators, shutters and window frames, trusses, rattaning, office and household furniture, stair-case, cart-wheels, pattern making, simple carving, upholstery and painting.

SHORT SPECIAL COURSES.

MOTOR-CAR MAINTENANCE AND DRIVING.

Theory—Short Course—Six to twelve months.

Turning a car out for a journey. Care of all wood work, paint work, upholstery and lamps. Proper utensils for washing and polishing body, wheels, mudguards and engine. Petrol haulage and storage.

The petrol engine and its parts. Calculation of h.p. The cooling and lubricating systems. Function of fly-wheel. The carburettor and its action. Proportion of air and petrol. The ignition system, fixed and variable ignition. Ford system.

Clutches and their proper adjustment. Steering gear, the Ackerman type rack and pinion, ball and socket, etc.

The transmission gear box and its parts. The gate and quadrant change propeller shafts, torque rods, etc.

The back axle, universal joints, radius rods, etc. Various types of drives and the advantages claimed for each. Brakes—how brake power is distributed and balanced.

Practical.

Correct driving, estimation of speed, rules of the road, common courtesy.

Tracing and dealing with troubles, choked jet, punctured float blocked filter, water in petrol, air lock and air leaks, wrong mixture flooding carburettor.

Timing and firing faults: worn platinum points, worn carbon brushes, bad connexions, faulty plugs, care of the clutch. Gear box, cause and prevention of wear in bearings, gear wheels, selector rods, etc. Care and adjustment of brakes. Signs and tests for damage in back axle. Precautions to avoid increase in amount of damage done. Testing wheel tracks. Loose wheels. Effects and remedies. Steering faults and their remedies. Care of springs. Effects of bad usage. Care of tyres and tyre repairs. Correct pressure of air in tyres.

OIL-ENGINE TENDING.

Short Course—Six to twelve months.

Elementary description of Otto cycle. Functions of different parts of the engine. Cleaning and care of an engine. Method of starting an engine.

Effect of interference with adjustments. Reasons for knock, back-fire and noisy running.

Fuels used and their cost. Fuel consumption and its relation to proper maintenance.

Lubrication.

Indications of bad running. Repairs and adjustments that a driver should or should not make. Keeping accounts.

General rules for the proper maintenance of an engine.

Cost of power. Meaning of depreciation.